

NEW SPECIES OF *CLITORIA* SUBGENUS *BRACTEARIA* SECTION *FLEXUOSAE* (FABACEAE) FROM PERU AND COLOMBIA¹

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Members of *Clitoria* L. subgenus *Bractearia* (Mart. ex Benth.) Fantz section *Flexuosae* Fantz are characterized (Fantz, 1979) by their nodose, subpaniculate, zigzag inflorescences that bear large flowers (6–9.5 cm) having a densely pubescent calyx (typically sericeous), which is obscured by large, conspicuous bracteoles (8–41 mm long, 6–15 mm wide). Section *Flexuosae* is unique in the genus in that members produce zigzag inflorescences. The flexuous central axis of the inflorescence may be weakly developed in some individuals, but it usually can be observed near the apex of the inflorescence. In other individuals, the flexuous inflorescence is developed strongly from the lowest flowering node upward. Section *Flexuosae* is also unique within the genus in that these species have a densely pubescent calyx in which the trichomes (1–2 mm long) are appressed and closely spaced (more or less silky in appearance), such that the surface of the calyx is obscured.

Members of section *Flexuosae* have been collected from refugia forests from Peru to southern Colombia at elevations of 250–600 m. Section *Flexuosae* comprises four species: *C. flexuosa* Fantz, *C. pozuzoensis* Macbride, and the two species described below. *Clitoria flexuosa* was originally described (Fantz, 1979) with a Latin diagnosis. A more complete description of this species and a description of a new variety are provided here.

1. *CLITORIA woytkowskii* Fantz, sp. nov.

Arbor ca 12 m altus, foliis trifoliolis, foliolis obovatis-ellipticis vel ellipticis, apice obtuso et acuminato abrupte, subra glabro, subtus nervis strigosibus; *petiolo et petioluto elongato*. *Inflorescentiae breves*, axe subpaniculati, infirme flexuoso. *Bracteae conspicui*, 7–10 mm longi, 4–7 mm lati. *Bracteolae grandibus*, elongati-oblongi, coriacei, longiora et occultantibus calyce, 41 mm longi, 13 mm lati. Calyce pubescentia confertis, trichomatibus brevibus, appressis, aspectibus sericeis aliquantum. Legumen ignotum.

Tree, ca 12 m tall. *Leaves* 3-foliate, coriaceous, concolorous, leaflets broad, elliptic to obovate-elliptic, apex broadly obtuse, abruptly acuminate, acumen 1–2 (2.5) cm long, 2–3 mm wide with expanded base of 6–10 mm width, base broad cuneate, midrib weakly raised on the upper surface with a shallow groove on each side, primary veins of 8–11 pairs, upper surface

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glabrous, lower surface conspicuously strigose along veins, lamina (6) 10–18 cm long, 5–10 wide. Petiole quadrangular-terete, strigose, with one to three shallow longitudinal grooves, (5) 9–13 cm long, with a swollen base of 7–11 mm; rachis (1.5) 2.5–3 cm; petiolules 8–11 mm, sparsely pubescent. Stipules deciduous, deltoid, broadly acute, sparsely pubescent, 4–5 mm long, 1–2 mm wide; stipels narrowly deltoid, acute, 3–4 mm long, 0.6–0.9 mm wide. *Inflorescence* short, subpaniculate, axillary, several-flowered, pubescence of juvenile axes silky, densely strigose, becoming sparsely strigose to glabrate; peduncle 3–5 mm; central axis 1–2.5 cm, nodose, primary branches that bear the pedicels subsessile, 1–3 mm long; rachis internodes 1–2 mm, weakly zigzag; pedicels not observed. Bracts conspicuously broad, reflexed in age, multiveined, moderately densely strigulose, somewhat silky, ciliolate, ovate, acute, 7–10 mm long, 4–7 mm wide. Bracteoles very large, coriaceous, broad and elongate-oblong, apex rapidly tapering, acute, densely strigulose and somewhat silky, 41 mm long, 13 mm wide. Flowers white flushed with red veins (*teste* Woytkowski), fully mature flowers not observed (immature vexillum 5.5 cm protruding slightly beyond calyx, comparison with other species of equivalent state indicates mature flower ca 7–8 cm). Calyx densely strigulose, somewhat silky in appearance, multinerved, tube 26 mm long, 9 mm wide at base expanding to 10 mm at throat, lobes ovate, short-acuminate, 6 mm long, 4 mm wide, ventral lobe 8 mm x 1.5 mm, narrowly deltoid. Vexillum pubescence densely strigulose, silky, claw broad, cuneate, 7 mm long. Alae extended beyond the carina by ca 5 mm, blade 22 mm long, 6–11 mm wide, subfalcate, microuncinate pubescent, claw 14 mm. Carina falcate, acute, microuncinate pubescent, blade 16 mm long, 5–6 mm wide, claw 22 mm. Stamens diadelphous, free stamens coherent to near the middle; tube split near the base into two points of attachment, 35 mm long; free filaments 2–5 mm; anthers 3 mm long, 1 mm wide, connective apiculate. Gynophore 11 mm; ovary densely sericeous, trichomes white with yellowish tinge, 17 mm long, 1.8 mm wide; style conspicuously dilated near point of geniculation, similar to a "cobra hood", nearly 1.5 mm wide, 18 mm long, geniculate 8 mm from distal end; stigma capitate, 1 mm diam. *Legume* unknown. Fig. 1.

TYPE COLLECTION: PERU. SAN MARTIN: Tree 12 m high, flowers white, rose flushed with red veins, in the forest, alt. 500 m, Saposoa, 12 Apr 1962, *Woytkowski* 7281 (HOLOTYPE: GH; ISOTYPE: US 2575475).

Both type specimens are deficient in some of the taxonomically critical structures. The Gray Herbarium specimen was selected as the holotype because it has both a dissected flower and mature leaves. However, no inflorescences are present. The Smithsonian specimen has smaller leaves and a few short inflorescence axes, but the flowers are lacking, having aborted. The short inflorescences and conspicuous bracts suggest segregation from the liana species of section *Flexuosae*.

Floral structures provide additional evidence. Some of the floral structures



Fig. 1. Holotype of *Clitoria woytkowskii* (Woytkowski 7281, GH).

of *C. woytkowskii* do not represent the mature state. Comparison with flowers of similar stages in the other two commonly collected species (*C. flexuosa* and *C. pozuzoensis*) of section *Flexuosae* indicates that the calyx, bracteoles, bracts, androecium, and gynoecium represent mature structures. The anthers are well-developed. Accordingly, these measurements should be fairly reliable. The sizes of the petals, especially the alae and vexillum, are smaller than those of the mature flower. Therefore, their measurements are subject to modification with additional collections of this species.

This species is known only from the type location. Prance (1973) identified this area as the "East Peru Forest Refuge", one of sixteen pleistocene forest refuges in the Amazon Basin.

2. *CLITORIA magentea* Fantz, sp. nov.

Vites lignosi. Folia trifoliata, foliolis oblongis ad ellipticis-lanceolatis, nervis primariis 14–18 parium. Inflorescentiae 3–8 cm, flexuoso. Bracteolae angustae, 5–7 mm latae, 13–15 mm longae. Flores parvi, magentei, 4–5 cm. Calyx tubo brevissimo, 13–15 mm. Legumen ignotum.

Liana, tall climbing to the top of trees. *Leaves* 3-foliolate, coriaceous, leaflets oblong to elliptic-lanceolate, nearly concolorous, apex acuminate, acumen 1–2.5 cm, base broadly cuneate to rotund, primary veins of 14–18 pairs, upper surface glabrous, lower surface with scattered appressed hairs borne primarily on the major veins, lamina 8–16 cm long, (3) 5–8 cm wide. Petioles subsquadrangular-terete, a longitudinal groove present or absent, 4–10.5 cm long, scattered appressed trichomes; rachis 1.5–2.5 cm; petiolules subsquadrangular, 6–9 mm. Stipules deciduous, ovate, sparsely strigose, ca 5 mm long, 3 mm wide; stipels 2–3 mm long, 1 mm wide. *Inflorescence* axillary and terminal, subpaniculate, several-flowered, flexuous, densely sericeous, 2–8 cm; pedicels 4–8 mm. Bracts ovate, acute, reflexed with age, 6–9 mm long, 4–5 mm wide, sericeous. Bracteoles oblong, apiculate, sericeous, 13–15 mm long, 5–7 mm wide, inserted 1 mm below the base of the calyx. Flowers small, 4–5 cm, magenta with red veins. Calyx pubescence silky, sericeous, tube obscured by the bracteoles, 13–15 mm long, 3–4 mm wide at the base expanding to 6–7 mm wide at the throat, lobes deltoid, 4–5 mm long, 3 mm wide, ventral lobe 5–6. Vexillum pubescence sericeous, blade 2.5 cm broad, claw 9–11 mm. Alae extended beyond the carina by 5–6 mm, blade 16–18 mm long, 4–6 mm wide, claw 9–10 mm. Carina falcate, blade 10 mm long, 3–4 mm wide, claw 15–18 mm. Stamens diadelphous, tube 28–31 mm long; free filaments 2–3 mm; anthers lanceolate, 2 mm long, 0.8 mm wide. Gynophore 5–6 mm, densely pubescent; ovary 9 mm long, 1–1.2 mm wide, densely pubescent, trichomes white tinged yellowish; style 20–21 mm, geniculate 8 mm from distal end, bearded; stigma capitate, 0.6–0.7 mm diam. *Legume* flat, coriaceous, long-stipitate, extended well beyond the calyx, pubescence moderately dense, trichomes to 1 mm long, appressed; stipe 32 mm; valves 14 cm long, 15–19 mm wide; dehiscence twisting 1/4–1/2 turns. Seeds black, compressed suborbicular faces, glabrous, 8–9 mm long, 8–10 mm wide, 2 mm thick; hilum oblong, 2 mm x 1 mm. Figure 2.

TYPE COLLECTIONS: COLOMBIA. CAQUETA: low secondary forest along small stream, 8 km SW of San Jose del Fragua (SW of Florencia), 300 m, 11 Jan 1974, *Davidse et al.* 5719 (HOLOTYPE: MO 2582506; ISOTYPE: MO 2582534). COLOMBIA. PUTUMAYO: disturbed riverside, Río Putumayo opposite mouth Río Gueppi on border with Ecuador and Peru, 200 m, 19 May 1978, *Gentry et al.* 22114 (PARATYPE: FLAS 147532 & 147533).

The paratype contains dissected flowers and bears the label data "flowers magenta" upon which the specific epithet is based. The holotype bears flowers plus mature fruits and seeds, and accordingly is a more representative specimen for the reproductive structures.

Clitoria magentea is the only species of section *Flexuosae* known to bear both small, magenta flowers and leaflets with 14–18 pairs of major veins. By these characters, it can be distinguished quickly from its close relatives. The other species all produce large flowers (6–8 cm) that are white, the vexillum bearing pink to red veins. Leaflets of these species typically bear 8–13 pairs of major veins.

This species is known presently from the type locations only. Prance (1973) identified this area as the "Napo Forest Refuge," one of sixteen Pleistocene forest refuges in the Amazon Basin.

3. CLITORIA FLEXUOSA Fantz, SIDA 8(1): 93. 1979.

Liana. *Leaves* 3-foliate, coriaceous, leaflets elongate, elliptic-lanceolate to oblong-lanceolate, occasionally ovate-lanceolate to oblanceolate, nearly concolorous, apex acuminate, acumen 2–2.5 cm, base rotund, midrib deeply impressed above, seemingly in a groove, often bearing short, suberect hairs, primary veins of 8–11 pairs, upper surface glabrous, lower surface subpilose with spreading hairs along major veins or stiff, appressed hairs, becoming sparse to subglabrate, lamina 8–22 (27) cm long, 3–9 (12) cm wide. Petioles subquadrangular-terete, 4–10 cm; rachis 1–2 (3) cm; petiolules subquadrangular, 6–8 mm, microuninate trichomes beneath spreading macrotrichomes. Stipules deltoid-lanceolate, acute, moderately dense, subappressed trichomes, 4–7 mm long, 2–3 mm wide; stipels linear, 3–6 mm long, 0.2–0.7 mm wide. *Inflorescence* axillary and terminal, solitary, subpaniculate, multiflowered, 2–10 cm; central axis densely pubescent, trichomes appressed, reddish-tinged, internodes conspicuously zigzag, bent alternatively in opposite directions at each successive node, 4–9 mm long; primary branches which bear the pedicels subsessile to 3 mm; pedicels 4–9 mm. Bracts conspicuous, ovate, more or less apiculate, concave, (6) 8–15 mm long, 6–9 mm wide, reflexed with age. Bracteoles very large, conspicuous, broad-oblong, obtuse to apiculate, subequalling the calyx to somewhat long, occasionally shorter to nearly half the calyx length (17–25 mm long in variety), typically 23–41 mm long, 9–15 mm wide. Flowers large, 6–8 cm, resupinate, white with veins of vexillum pink to dark red. Calyx pubescence silky, dense, appressed, tube 21–29 (32) mm long, 4–6 mm wide at the base expanding to 8–11

mm wide at the throat, lobes deltoid-ovate, nearly glabrous towards margins and apex, acute, 4–6 mm long, 3–4 mm wide, ventral lobe 6–7 mm. Vexillum pubescence silky, dense appressed, argenteous in bud becoming reddish-brown, blade 4–5 cm wide, claw 12–16 mm. Alae extended beyond carina by 7–8 mm, blade 23–30 mm long, 5–12 mm wide, broadened beyond carina apex, claw 21–26 mm. Carina falcate, 13–19 mm across, 4–7 mm wide, claw 33–38 mm. Stamens diadelphous, tube glabrous, split near the base into two points of attachment, 39–45 mm long; free filaments 2–6 mm; anthers large, 2.5–3 mm long, 0.7–0.9 mm wide. Gynophore elongate, 7–10 mm; ovary 17–18 mm long, 1.5–1.8 mm wide, densely pubescent, trichomes appressed, white tinged yellowish; style 18–26 mm long, bearded, geniculate 7–9 mm from distal end; stigma subcapitate, 0.8 mm diam. *Legume* flat, coriaceous, long-stipitate, extending beyond the calyx, pubescence scattered, trichomes appressed; stipe 33–39 mm; valves 16–17 cm long, 14–19 mm wide; dehiscence not observed. Seeds brown, compressed, faces suborbicular, smooth, ca 12 mm long, 10 mm wide, 4 mm thick, 6–7 seeds per pod; hilum oblong, 2 mm x 1 mm. Figure 3.

TYPE COLLECTIONS: PERU. SAN MARTIN: Tarapoto, Feb 1856, *Spruce* 4527 (HOLOTYPE: K-Hb. Bentham; ISOTYPES: K-Hb. Hooker, W 18669). PERU. SAN MARTIN: Juan Jui, Alto Río Huallaga, ca 400 m, Sep 1934, *Klug* 3820 (PARATYPES: BM, F 766344, GH, MO 1105520 & 1105521). PERU. SAN MARTIN: Tarapoto, *Spruce s.n.* (K).

Spruce 4527 was chosen as the type collection because the specimens have the typical flexuosus inflorescences bearing both flowers and fruit. Of the collections examined, only the holotypic specimen exhibits fruit. The specimen in the Hooker Herbarium at Kew has the very strongly zigzag inflorescence for which the species was named. *Spruce s.n.* was selected as a paratype since the specimen was from the type locality and in reality may be a duplicate in which only part of the data was transferred to the label. *Klug* 3820 was also selected as a paratypic collection because of the strongly zigzag inflorescences and dissected flowers (GH), which added to the original description.

This species has close affinities with *C. pozuzoensis* Macbride which differs by bearing smaller bracteoles ($1/4$ – $1/3$ the length of the calyx) and bracts (3–6 mm long), a shorter stipe (25–34 mm), a longer staminal tube (43–51 mm), and nearly glabrate leaves with inconspicuous, short, appressed hairs on the lower surface.

This species is known from departments San Martín and Loreto, Peru, within, and extending slightly west, of the area described by Prance (1973) as the "East Peru Forest Refuge". Specimens from each department exhibit different morphological characteristics and are treated as varieties.

3a. CLITORIA FLEXUOSA Fantz var. FLEXUOSA

Leaves pilose below, becoming glabrate, trichomes on major veins ascend-



Fig. 3. Holotype of *Clitoria flexuosa* (Spruce 4527, K-Hb. Bentham).

ing, spreading. Bracteoles elongate, subequal to longer than the calyx, occasionally slightly shorter (ca 0.9 x calyx), 23–40 mm long, 10–17 mm wide. Collected from San Martín, Peru.

3b. *CLITORIA FLEXUOSA* Fantz var. *brevibracteola* Fantz, var. nov.

Varietas novo *Clitoria flexuosa* distinguibili ad bracteolae calycem 2–4 plo brevior et angustior, et foliis subter glabrescentes.

Leaves minutely pubescent below (vidi 20X), trichomes short, appressed. Bracteoles shortened, one-half to three-quarters of the calyx length, 17–25 mm long, 8–10 mm wide. Collected from Loreto, Peru.

TYPE COLLECTION: PERU. LORETO: Forest clearing, Balsapuerto, 220 m, Jun 1933, *Klug* 3105 (HOLOTYPE: G-Hb. Delessert, 2 sheets; ISOTYPES: A, BM, F 684787, GH, MO 1065939, S).

The Geneva specimen is mounted on two sheets within a common cover folder. It is the only specimen to exhibit fruit and a mature seed. The first sheet has a branch with leaves and a juvenile inflorescence. The second sheet has a fruit, a leaf, two flowers, one seed, and a pack with a fruit fragment.

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